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भारतीय मानक

सड़क वाहन — द्रवित पेट्रोलियम गैस (एलपीजी)
सापेक्ष उपस्कर — ईंधन रेल

Indian Standard

ROAD VEHICLES — LIQUEFIED PETROLEUM GAS
(LPG) SPECIFIC EQUIPMENT — FUEL RAIL

ICS 43.060.40; 75.160.30

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BUREAU OF INDIAN STANDARDS
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Price Group 2

FOREWORD

This Indian Standard was adopted by Bureau of Indian Standards, after the draft finalized by the Automotive Vehicles Running on Non-Conventional Energy Sources Sectional Committee had been approved by the Transport Engineering Division Council.

In the formulation of this standard, considerable assistance has been derived from UNECE Regulation No. 67 (Revision 2 — Amendment 2 : Supplement 8 to the 01 series of amendments: Date of entry into force: 3 February 2008) 'Uniform provisions concerning: Part 1 — Approval of specific equipment of motor vehicles using liquefied petroleum gases in their propulsion system'.

Considering Indian conditions, the Committee decided to deviate from ECE Regulation R-67 with respect to the following:

- a) Scope has been extended to L category vehicles which cover two and three wheelers;
- b) Class 1A has been added and test requirements for Classes 1A are incorporated;
- c) Marking requirements has been specified as per existing BIS practices;
- d) COP tests are included; and
- e) Criteria for extension of approval has been incorporated.

The following documents may be referred to for latest update on statutory requirements related to use of LPG fuel system in internal combustion engine vehicles:

- a) *Central Motor Vehicle Rules*, 1989 (CMVR) (as amended from time-to-time); and
- b) *Motor Vehicle Act*, 1988 (MVA) (as amended from time-to-time).

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

ROAD VEHICLES — LIQUEFIED PETROLEUM GAS (LPG) SPECIFIC EQUIPMENT — FUEL RAIL

1 SCOPE

1.1 This standard specifies definitions, general design requirements, performance and test methods of fuel rail of LPG specific equipment of motor vehicles of category L, M and N as defined in IS 14272 : 2011 'Automotive vehicles — Types — Terminology' using LPG in their propulsion system.

1.2 This standard is applicable to LPG specific equipment intended to use on vehicles using liquefied petroleum gas (LPG) in accordance with Central Motor Vehicle Rules.

1.3 This standard is not applicable to the LPG specific equipment used in agricultural tractors and construction equipment vehicles.

2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

<i>IS No.</i>	<i>Title</i>
15956 : 2012	Road vehicles — Liquefied petroleum gas (LPG) specific equipment — Definitions, classification and general requirements
15957 : 2012	Road vehicles — Liquefied petroleum gas (LPG) specific equipment — General design requirements, performance and test methods

3 DEFINITIONS

For the purpose of this standard definitions as given in IS 15956 shall apply.

4 CLASSIFICATIONS OF FUEL RAIL

4.1 LPG fuel rail is classified in IS 15956 according to the maximum operating pressure, as given in Table 1.

5 DESIGN TEMPERATURES

The components of fuel rail shall be designed for temperatures of -20°C to 120°C . For temperatures

exceeding 120°C , special test conditions shall be applicable.

Table 1 Classification of LPG Fuel Rail
(Clause 4.1)

Sl No.	Classification	Classification Pressure kPa (3)	Details of Components (4)
(1)	(2)	(3)	(4)
i)	Class 1	3 000	High pressure LPG fuel rail containing liquid LPG or vapour LPG at vapour pressure or increased vapour pressure up to 3 000 kPa
ii)	Class 1A	2 000	High pressure LPG fuel rail containing liquid LPG or vapour LPG at vapour pressure or increased vapour pressure up to 2 000 kPa
iii)	Class 2	450	Low pressure LPG fuel rail containing vapourized LPG with a maximum operating pressure below 450 kPa and over 20 kPa above atmospheric pressure
iv)	Class 2A	120	Low pressure LPG fuel rail for a limited pressure range containing vapourized LPG with a maximum operating pressure below 120 kPa and over 20 kPa above atmospheric pressure

6 CONSTRUCTION AND ASSEMBLY

The fuel rail shall comply with the provisions of 5 of IS 15956 and with the tests specified in 7.

7 TESTS AND TEST PROCEDURES

Applicable tests and test procedures for type approval parts of Class 1, 1A, 2 and/or 2A are given in Table 2.

8 MARKING

8.1 Each fuel rail shall be permanently and legibly marked with the following information:

- a) Manufacturers name or trade-mark, if any;
- b) Part No. or unique identification mark/Type No./Model No.;

- c) Maximum operating pressure or class;
- d) Month and year of manufacture or codes thereof or batch number; and
- e) Approval No. or BIS Standard Mark if applicable.

Table 2 Tests and Test Procedures
(Clause 7)

Sl No.	Tests	Procedure, Ref to Cl of IS 15957	
		Class 1/1A	Class 2/2A
(1)	(2)	(3)	(4)
i)	Over pressure test	7	7
ii)	External leakage	8	8
iii)	High temperature	9	9
iv)	Low temperature	10	10
v)	LPG compatibility	14 ¹⁾	14 ¹⁾
vi)	Corrosion resistance	15 ²⁾	15 ²⁾
vii)	Resistance to dry heat	16 ¹⁾	—
viii)	Ozone ageing	17 ¹⁾	—
ix)	Creep	18 ¹⁾	—
x)	Temperature cycle	19 ¹⁾	—

¹⁾ Only for non-metallic parts.
²⁾ Only for metallic parts.

8.2 BIS Certification Marking

Each fuel rail may also be marked with the Standard Mark.

8.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

9 TECHNICAL INFORMATION TO BE SUBMITTED BY THE COMPONENT MANUFACTURER

Technical information to be submitted by the component manufacturer for component type test (type approval) shall contain at least the following information:

- a) Name and address of the manufacturer;
- b) Manufacturing plant address;
- c) Part No./Unique identification mark/Type No./Model No.;
- d) Maximum operating pressure;
- e) Operating temperature range; and
- f) Drawings with relevant dimensions and material with grade.

10 ACCEPTANCE TEST (CONFORMITY OF PRODUCTION)

For the purpose of acceptance tests, each fuel rail shall conform to the following tests (*see 7.1*).

Sl No.	Applicable Tests	Applicable to Class
(1)	(2)	(3)
i)	Over pressure test	Class 1, 1A, 2 and 2A
ii)	External leakage	Class 1, 1A, 2 and 2A
iii)	Temperature cycle test ¹⁾	Class 1, 1A
iv)	LPG compatibility ¹⁾	Class 1, 1A, 2 and 2A

¹⁾ Only for non-metallic parts.

11 CHANGES IN TECHNICAL SPECIFICATIONS OF A TYPE APPROVED COMPONENT AND EXTENSION OF APPROVAL

11.1 Any functional modification in technical specification declared in accordance with 9 shall be intimated to the test agency.

11.2 Testing agency may then consider, whether,

- a) the component with modification complies with specified requirements; or
- b) any further test/verification is required.

In case of (b), checks need to be carried out only for those parameters which are affected by the modifications. For deciding whether any further verification/test is required in case of (b), guidelines given in Table 3 shall be followed.

In the event of (a) or (b) after successful compliance to requirements, the certificate of compliance shall be validated for the modified version.

Table 3 Verification/Tests Required
(Clause 11.2)

Sl No.	Parameter /Criteria	Whether Verification is Required
(1)	(2)	(3)
i)	Change of Class from 2 or 2A to 1 (or) 1A, or 1A to 1	All tests given in 7.1 related to change in pressure to be carried out
	Change of Class 1 to 2 or 2A (or) 1 to 1A	No verification required
ii)	Change in material	If there is change in the material of fuel rail body, relevant tests need to be carried out
iii)	a) Increase in working pressure within the same class	a) Over pressure, external leakage, creep and temperature cycles as applicable are required
	b) Decrease in working pressure	b) No test required
iv)	Change in operating temperature range	No test is required, if the change is within the range specified for tests
v)	Addition of parts to change direction of out let or inlet	No verification required

11.3 For any change in parameters other than given in 9 and those covered in Table 3, no re-type approval is required.

ANNEX A*(Foreword)***COMMITTEE COMPOSITION****Automotive Vehicles Running on Non-Conventional Energy Sources Sectional Committee, TED 26**

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Automotive Research Association of India, Pune	SHRI SHRIKANT R. MARATHE (Chairman)
Ashok Leyland Ltd, Chennai	SHRI PRASSAN DESHPANDE SHRI S. ARUN (<i>Alternate</i>)
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Rutu Gas Pvt Ltd, Ahmedabad	SHRI RAJESH KOTHARI

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<i>Member Secretary</i> SHRI T. V. SINGH Scientist 'F' (TED), BIS	

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Amendments Issued Since Publication

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